Development of the AMEGO Prototype Si Tracker Front End (AMEGO)

Completed Technology Project (2017 - 2019)

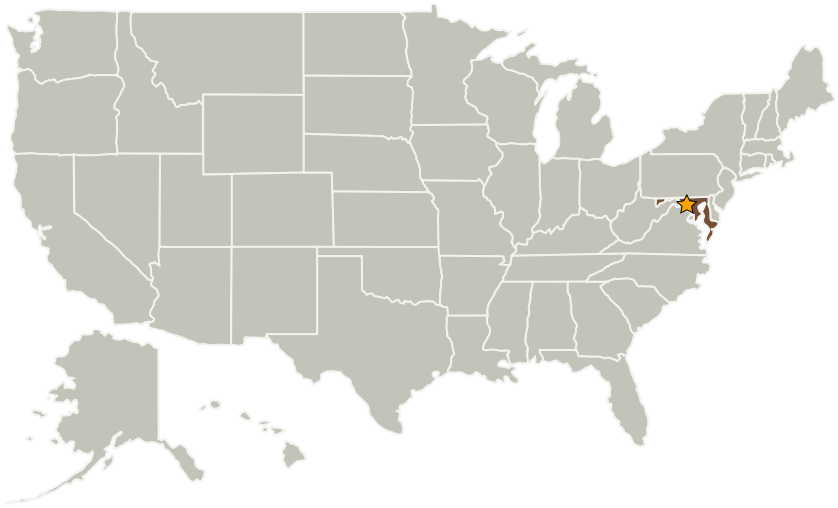
Project Introduction

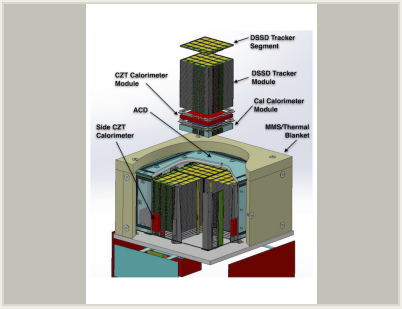
Development of the front end electronics (FEE) for a prototype Si Tracker for AMEGO (All-sky Medium-Energy Gamma-ray Observatory; https://asd.gsfc.nasa.gov/amego/). AMEGO is a probe class mission concept in the MeV band and detects MeV gamma rays by Compton scattering and pair production via a Si Tracker, CsI and CZT calorimeters, and a plastic anti-coincidence shield (ACD). There are several technical development projects underway supported by APRA grants and the FEE for the tracker is a vital component.

Anticipated Benefits

This technology maturation project will develop the FEE for the prototype AMEGO Si Tracker and balloon payload. While Si trackers have been used in astrophysics before (Fermi LAT and PAMELA are examples) there are challenges building a double-sided silicon detector (DSSD) based tracker of this scale. The baseline AMEGO design is a 4x4 array of 9.5 cm square DSSDs wirebonded in series. Each DSSD has 192 channels on the top and the bottom and these are read out by ASICs on the edges of each 4x4 array. The number of channels dictates that the power per channel must be low and the length of the signal paths dictates that the capacitance per strip needs to be low. This project will develop a low-power, low-noise FEE using off-the-shelf ASICs.

Primary U.S. Work Locations and Key Partners





Exploded view of the AMEGO instrument

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Center Independent Research & Development: GSFC IRAD

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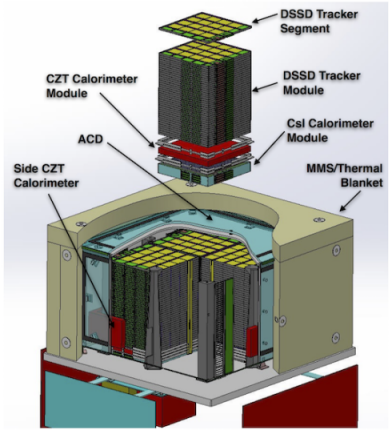
Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations
Maryland

Images



AMEGO Exploded
Exploded view of the AMEGO instrument
(https://techport.nasa.gov/image/28238)

Project Website:

https://asd.gsfc.nasa.gov/amego/

Organizational Responsibility

Responsible Mission Directorate:
Mission Support Directorate (MSD)

Lead Center / Facility:
Goddard Space Flight Center (GSFC)

Responsible Program:
Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:
Peter M Hughes

Project Manager:
Keith M Jahoda

Principal Investigator:
Jeremy S Perkins

Co-Investigators:
Julie E Mcenery
Elizabeth A Hays
Sean Griffin

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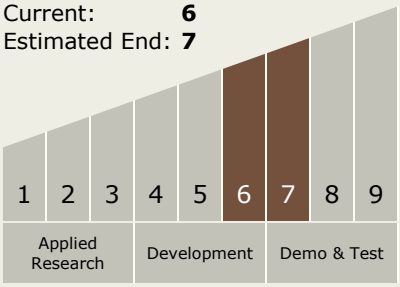
Technology Maturity (TRL)

Start: **6**
Current: **6**
Estimated End: **7**



Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.5 Mission Architecture, Systems Analysis and Concept Development
    - TX11.5.1 Tools and Methodologies for Defining Mission Architectures or Mission Design

Target Destinations

Outside the Solar System, Foundational Knowledge

Supported Mission Type

Projected Mission (Pull)